

## INSTALLATION MANUAL GPS NAVIGATOR GP-90

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**FURUNO ELECTRIC CO., LTD.**  
NISHINOMIYA, JAPAN



# SAFETY INSTRUCTIONS



## WARNING



**Do not work inside the equipment unless totally familiar with electrical circuits.**

Hazardous voltage which can cause electrical shock, burn or serious injury exists inside the equipment.



**Turn off the power at the mains switchboard before beginning the installation. Post a sign near the switch to indicate it should not be turned on while the equipment is being installed.**

Fire, electrical shock or serious injury can result if the power is left on or is applied while the equipment is being installed.



## CAUTION



**Ground the display unit to prevent loss of sensitivity and mutual interference.**

**Confirm that the power supply voltage is compatible with the voltage rating of the equipment.**

Connection to the wrong power supply can cause fire or equipment damage. The voltage rating appears on the label at the rear of the display unit.

**Use the correct fuse.**

Use of a wrong fuse can cause fire or equipment damage.

**Keep the following compass safe distances:**

	Standard	Steering
Display unit	0.45 m	0.30 m

# 1. EQUIPMENT LIST

## Standards

Name	Type	Q'ty	Mass (kg)	Remarks	
Antenna Unit	GPA-017S	1		For DGPS	
	GPA-018S				
	GPA-019S				
Display Unit	GP-90-N	1	2.2	Without Beacon RX	
	GP-90-A			With Beacon RX	
Installation Materials	CP20-01900	1 set		See lists at end of manual.	With Antenna Cable
	CP20-01950				Without Antenna Cable
Spare Parts	SP20-00500	1 set			

## Options

Name	Type	Code No.	Remarks
Flush Mount Kit S	OP20-24	004-393-000	For display unit.
Flush Mount Kit F	OP20-25	004-393-280	
Antenna Cable Set	CP20-01700	004-372-110	CP20-01701+30 m cable
	CP20-02700	004-381-160	CP20-02701+30 m cable
	CP20-01710	004-372-120	CP20-01701+50 m cable
	CP20-02710	004-381-170	CP20-02701+50 m cable
Antenna Cable Assy.	TNC-PS-3D-15	000-133-670	15 m
Right Angle Antenna Base	No.13-QA330	000-803-239	For antenna unit.
L-Type Antenna Base	No.13-QA310	000-803-240	
Handrail Antenna Base	No.13-RC5160	000-806-114	
Mast Mount Kit	CP20-01111	004-365-780	
Cable Assy	MJ-A6SPF0011-050 (03S9202)	000-132-244	Cross Cable 5m, 6p-4p
	MJ-A6SPF0011-100 (03S9226)	000-132-336	Cross Cable 10m, 6p-4p
	MJ-A7SPF0003-050 (20S0241)	000-136-730-01	5m, For DATA4
	MJ-A6SPF0003-050C (20S0093)	000-154-054-10	5m
	MJ-A6SPF0012-050C (64S4073)	000-154-053-10	Cross cable 5m
	MJ-A6SPF0012-100C (64S4071)	000-154-037-10	Cross cable 10m
Beacon Receiver Set	OP20-32-1	000-041-018	With GPA-018S
	OP20-32	000-041-019	With whip antenna and OP20-32-1
	OP20-33	000-041-596	With GPS-019S
	OP20-34	000-041-598	Without whip antenna
Rectifier	PR-62	000-013-485	For 100VAC mains
		000-013-486	For 220VAC mains
DGPS Beacon Receiver	GR-80	-	
Whip Antenna	FAW-1.2	000-130-046	1.2 m

## 2. DISPLAY UNIT

The display unit can be installed with either of four methods as shown below. Refer to the outline drawing at the end of manual.

- Locate the unit away from exhaust pipes and vents.
- The mounting location should be well ventilated.
- Mount the unit where shock and vibration are minimal.
- Keep the display unit away electromagnetic field generating equipment such as motor, generator.
- Allow sufficient maintenance space and a sufficient slack in cables for maintenance and repair.

### Table Top and Overhead Mounting

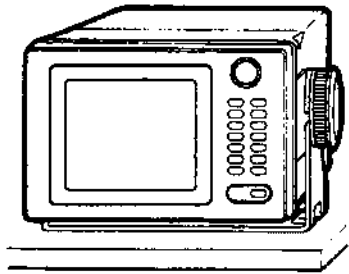
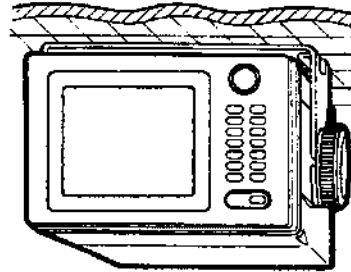


TABLE TOP



OVERHEAD

*Display unit mounting methods*

### Flush mounting type F

An optional flush mount kit type F is required. For details, see outline drawing at end of manual.

Name	Type	Code No.
Flush Mount Kit F	OP20-25	004-393-280

### Flush mounting type S

An optional flush mount kit type S is required. For details, see outline drawing at end of manual.

Name	Type	Code No.
Flush Mount Kit S	OP20-24	004-393-000

# 3. ANTENNA UNIT

## Mounting

Install the antenna unit referring to the installation diagram at end of manual. When selecting a mounting location for the antenna unit, keep in mind the following points.

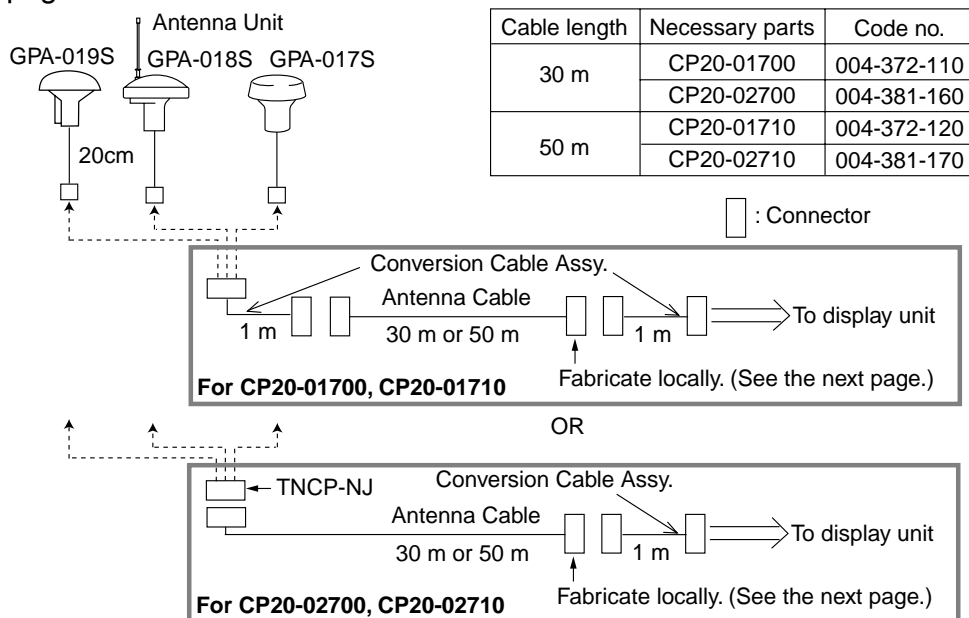
- **Select a location out of the radar beam.** The radar beam will obstruct or prevent reception of the GPS satellite signal.
- **Be sure the location offers a clean line-of-sight to satellite.** Objects within line-of-sight to a satellite, for example, a mast or funnel, block reception and cause prolonged acquiring time or interruption of position fix.
- **Mount the unit as high as possible.** Mounting the antenna as high as possible keeps it free of water spray, which can intercept reception of GPS satellite signal, if water spray is frozen.
- **The antenna unit GPA-018S must be grounded.** Connect ground wire of 1.25 sq or larger (local supply) between the antenna unit and a stainless steel screw fastened to the mast.
- **The antenna unit GPA-018S must be taped.** See chapter 7 for instructions.

## Extending Antenna Cable Length

The standard cable is 15m long. 30m and 50m long extension cable sets are optionally available.

### ◆ Extension cable line-up

Fabricate the end of antenna cable and attach the coaxial connector. Details are shown on next page.



Extension Cable Line-up

### ◆ Waterproofing the connector

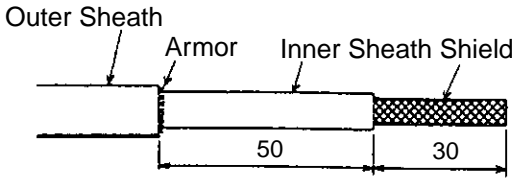
Wrap connector with vulcanizing tape and then vinyl tape. Bind the tape end with cable-tie.



How to waterproof the connector of the antenna cable

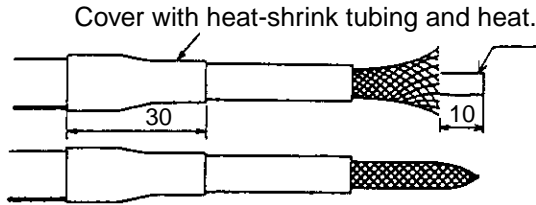
### 3. ANTENNA UNIT

#### **How to attach the N-P-8DFB connector**



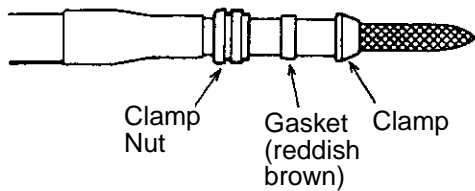
Remove outer sheath and armor by the dimensions shown left.

Expose inner sheath and shield by the dimensions shown left.

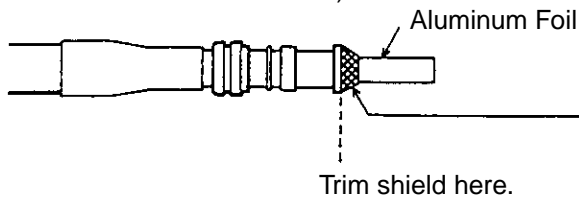


Cut off insulator and core by 10mm.

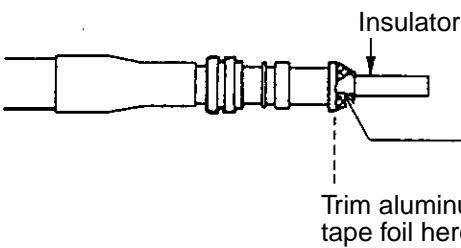
Twist shield end.



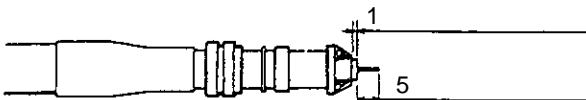
Clip on clamp nut, gasket and clamp as shown left.



Fold back shield over clamp and trim.

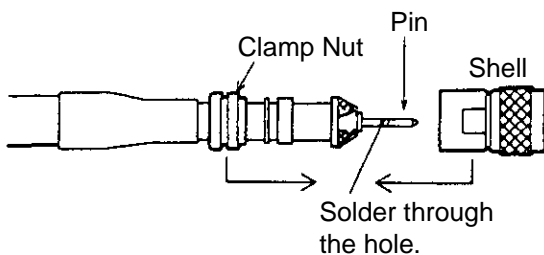


Fold back aluminum foil onto shield and trim.



Expose the insulator by 1mm.

Expose the core by 5mm.





Slip the pin onto the conductor. Solder them together through the hole on the pin.

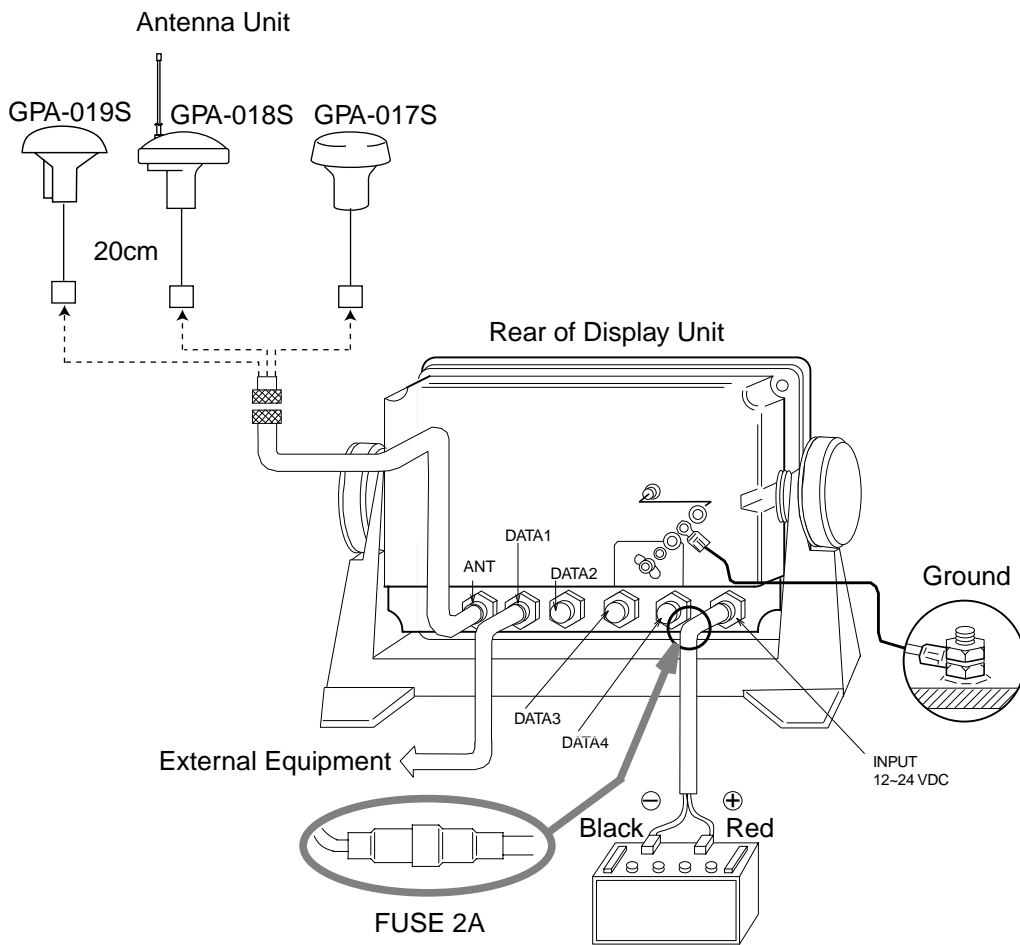
Insert the pin into the shell. Screw the clamp nut into the shell.

(Tighten by turning the clamp nut. Do not tighten by turning the shell.)

# 4. WIRING

The figure below shows the connection of cables on rear of display unit.

	<b>CAUTION</b>
	<b>Ground the display unit to prevent loss of sensitivity and mutual interference.</b>



*Connection of cables on display unit*

## Grounding

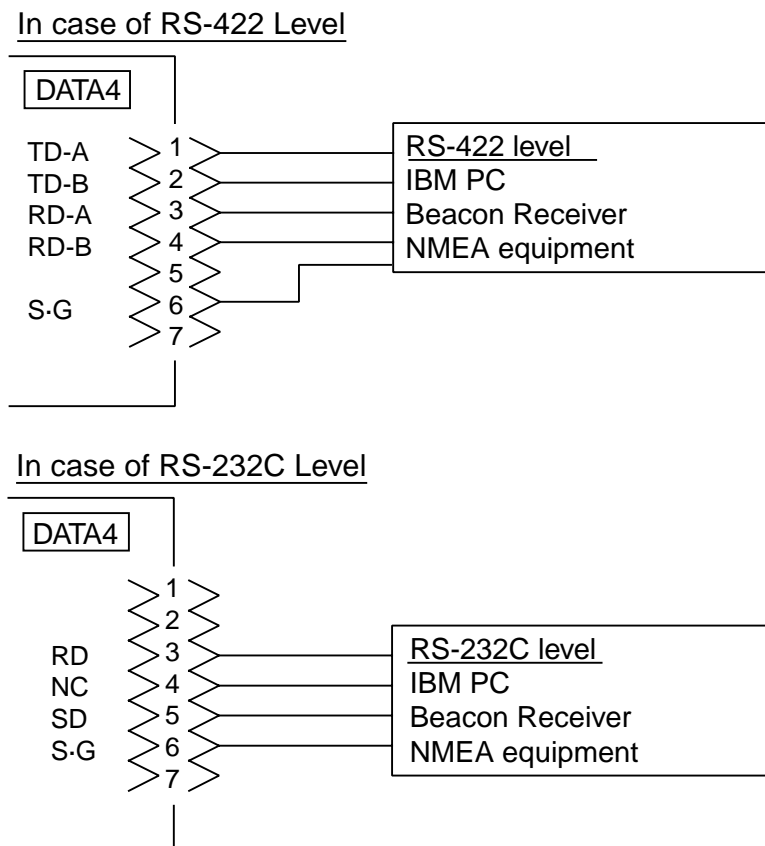
The display unit contains several CPUs. While they are operating, they radiate noise, which can interfere with other radio equipment. Ground the unit as follows to prevent it.

- The grounding wire should be 1.25sq or larger.
- The grounding wire should be as short as possible.

## External Equipment

The DATA1, DATA2, and DATA3 ports are used to connect an external equipment such as autopilot, remote display, navigation equipment. Refer to the interconnection diagram on page S-1 for connection of DATA1, DATA2 and DATA 3 port. The DATA4 port is used to connect NMEA equipment, IBM-PC or DGPS beacon receiver as follows;

### Connection of DATA4 port



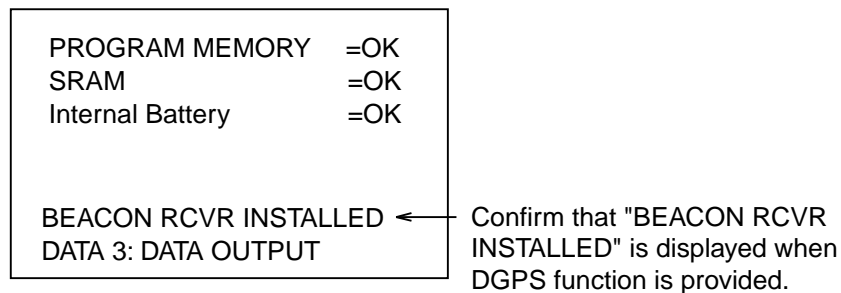
NOTE: See page 15 for selection of input/output signal.



# 5. INITIAL SETTINGS

## Checking Operation

1. Turn on the GP-90.
2. Confirm that "OK" and "BEACON RCVR INSTALLED" are displayed on the self-test display.



*Self-test display at equipment start up*

3. Press [MENU ESC], [8] and [1]. Confirm that "BEACON OK" is displayed.

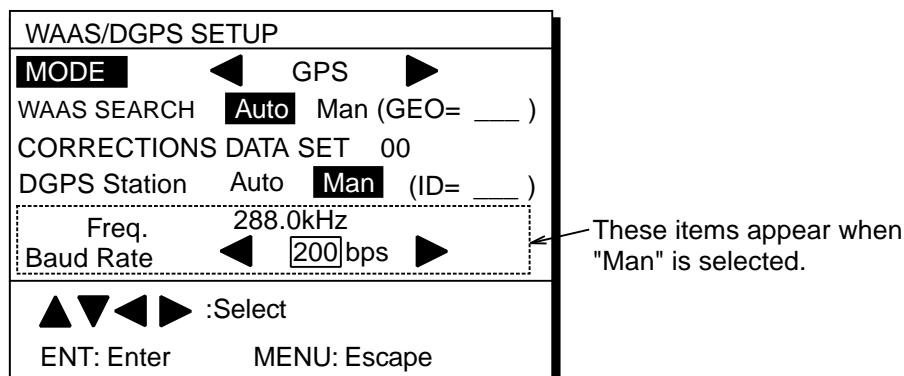
## DGPS Setup

The default setting is "manual".

### Automatic DGPS setup

The beacon receiver (GR-7000A) can automatically select optimum reference station by feeding GP-90's position data. If it takes more than 5 minutes to fix DGPS position at the automatic mode, switch to manual mode. Use the manual mode when an external beacon receiver has no automatic function of station selection.

1. Press [MENU ESC], [9] and [7] to display the DGPS SETUP menu.



*Figure 5-1 DGPS SETUP menu*

2. Press ▲ or ▼ to select DGPS MODE and press ◀ to select "INT BEACON".
3. Press ▲ or ▼ to select DGPS Station.
4. Press ◀ to select Auto.

## 5. INITIAL SETTINGS

5. Press the [NU/CU ENT] key.
6. Press the [MENU ESC] key.

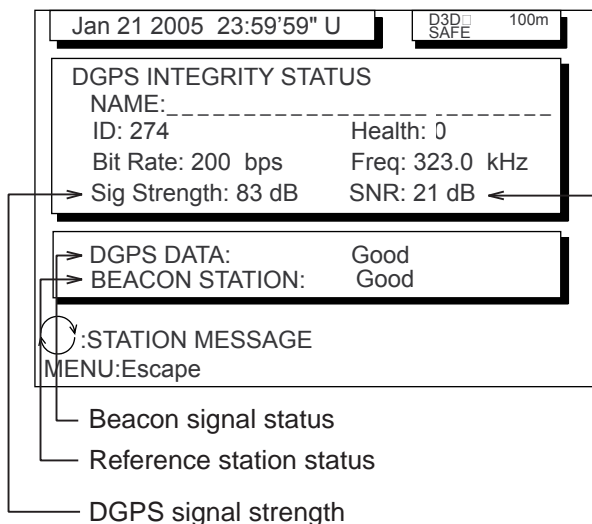
## Manual DGPS setup

Enter four digit ID number, frequency and baud rate of station.

1. Press [MENU ESC], [9] and [7] to display the DGPS SETUP menu.
2. Press ▲ or ▼ to select DGPS MODE and press ◀ to select "INT BEACON".
3. Press ▲ or ▼ to select DGPS Station.
4. Press ◀ to select Man.
5. Enter four digit ID number. You can clear an entry by the [CLEAR] key.  
If there is no ID number, press the [NU/CU ENT] key.
6. Press the [NU/CU/ENT] key.  
If the number entered is invalid, the buzzer sounds and the message "INVALID ID" appears on the display for three seconds.
7. Enter frequency in four digits (283.5 kHz to 325.0 kHz).
8. Press the [NU/CU ENT] key. "Baud Rate" appears in reverse video.
9. Press ◀ or ▶ to select baud rate; 25, 50, 100 or 200bps.
10. Press the [MENU ESC] key.

## DGPS Operation checking

1. Press [MENU ESC] and [7].
2. Press [↻] several times to display the following.



This value is between 1 and 84.  
The higher the value,  
the stronger the signal.  
If a noise appears at reception band width,  
the value becomes bigger.

This value is between 1 to 22. The higher the value, the better the reception of beacon signal. When this value is less than 20, the error is included in the correction data. In this time, position fixing is done by using past position data. When the ship is in the service area of a beacon station, this value should be 21 or 22. If not, check as follows.

- Check the grounding.
- Check the radar beam interference.
- Check the noise of power generator of the ship.

Figure 5-2

## Input/Output Setting

The GP-90 can output navigation information to external equipment. For example, it can output position data to a radar or echo sounder for display on their display screen. You can convert a Loran Plotter to a GPS Plotter with position data from the GP-90.

Before selecting data to output, confirm what data the external equipment requires. Output necessary data only. Outputting unnecessary data can cause receiving problems at the external equipment.

### Talker

All data transmitted by marine electronics equipment is prefixed with a two-character code which tells external equipment what equipment is transmitting data. This two-character code is called the talker. The GP-90 contains the talkers GP, LC and DE.

Because GPS is a relatively new system some early model equipments do not recognize the GP talker name. In this case transmit data using a conventional talker, which equipment recognizes, such as Loran C.

## Data format and data output availability

### Output data sentence of IEC 61162-1 and NMEA 0183 Ver. 1.5/2.0.

- AAM: Waypoint arrival alarm
- APB: Autopilot sentence B  
magnitude of cross track error, direction to steer, arrival alarm, bearing to waypoint  
("Heading to steer to destination waypoint data" not used)
- BOD: Bearing-origin to destination
- BWC: Bearing and distance to waypoint-great circle
- BWR: Bearing and distance to waypoint-rhumb line
- BWW: Bearing-waypoint to waypoint
- DTM: Datum reference
- GGA: Global positioning system (GPS) fix data  
time of fix, latitude, longitude, quality indicator, number of satellites in use, DOP,  
altitude, geoidal separation  
("age of dgps data" and "differential reference station ID" not used)
- GLL: Geographic position-latitude/longitude
- GNS: GNSS fix data
- GBS: GPS satellite fault detection
- RMB: Recommended minimum navigation information cross track error, direction to steer,  
origin and destination waypoint ID, destination waypoint latitude and longitude,  
range and bearing of destination waypoint, destination closing velocity, arrival  
alarm
- RMC: Recommended minimum specific GPS/TRANSIT data  
UTC of position fix, latitude and longitude, ground speed and course, date,  
magnetic variation
- RTE: Routes
- VDR: Set and drift
- VTG: Course over ground and ground speed
- WCV: Waypoint closure velocity
- WPL: Waypoint location
- XTE: Cross-track error, measured
- ZDA: Time and date
- Rnn: Routes

Also, following NMEA 0183 Ver. 1.5 sentence is output.

- APA: Autopilot sentence "A"  
magnitude of cross track error, direction to steer, arrival alarm, bearing origin to  
destination.

**Input data sentence of NMEA 0183 Ver. 1.5/2.0**

Checksum is checked if attached, and if any errors are found, the sentence becomes invalid.

Talker ID is not distinguished.

DBT: Depth below transducer

DPT: Depth

HDG: Heading, deviation and variation

HDM: Heading, magnetic

HDT: Heading, true

MTW: Water temperature

TLL: Target latitude and longitude

VBW: Dual ground/water speed

VHW: Water speed and heading.

FURUNO proprietary sentence

AGFPA: Autopilot information from FURUNO autopilot equipments.

## 5. INITIAL SETTINGS

AGFPA: Autopilot information from FURUNO autopilot equipments

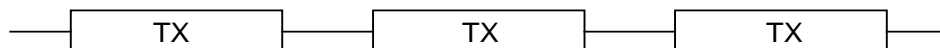
Port	Input	Output
DATA1 DATA2	<u>NMEA 0183</u> <u>Ver. 1.5 /2.0</u> AGFPA , DBT, DPT, HDG, HDM, HDT, MTW, TLL, VBW, VHW	<u>IEC 61162-1/NMEA 0183 Ver.1.5/</u> <u>Ver.2.0</u> AAM, APA, APB, BOD, BWC, BWR, BWW, GGA, GLL, GNS, RMB, RMC, VDR, VTG, WCV, WPL, XTE, ZDA, GBS, Rnn, RTE
DATA3	External MOB	LOG PULSE Same as the data output form "DATA1"
DATA4	DGPS or general data (Selected by menu)	General data <u>IEC 61162-1/NMEA 0183 Ver.1.5/</u> <u>Ver.2.0</u> AAM, APA, APB, BOD, BWC, BWR, BWW, GGA, GLL, GNS, RMB, RMC, VDR, VTG, WCV, WPL, XTE, ZDA, GBS, Rnn, RTE

### General data

- 1) Input of waypoint data  
Connect YEOMAN equipment to DATA4 port.
- 2) Input and output of waypoint / route data

### Rate of operation

The TX rate of operation is the percentage of data output in one second, and it appears on the screen. If short intervals are assigned to many sentences, the rate of operation increases as illustrated below



Note: Output data should be less than 100%.

When the external equipment cannot display correct data input from the GP-90, the rate of operation should be lowered. For example, set a rate of operation less than 60 % for the Temperature Indicator TI-20.

## DATA 1 output setting

1) Press [MENU], [9] and [3]. The DATA 1, 3 OUTPUT SETUP menu appears.

DATA 1, 3 OUTPUT SETUP			
Data Fmt.	V1.5	V2.0	<b>IEC</b>
Talker ID	<b>GP</b>	LC	DE
Output Data	(00-90 sec)	100%	
1.	AAM:00	APA:00	APB:04 BOD:00
2.	BWC:00	BWW:00	GGA:00 GLL:01
3.	RMB:01	RMC:00	VTG:01 WCV:00
4.	VDR:00	WPL:00	XTE:00 ZDA:01
5.	GNS:00	GBS:01	Rnn:00 RTE:00
DATA3. Log Pulse	<b>200ppm</b>	400ppm	
ENT : Enter		MENU : Escape	

Settings shown here are default settings.

This line appears only when LOG is selected by internal jumper wires.

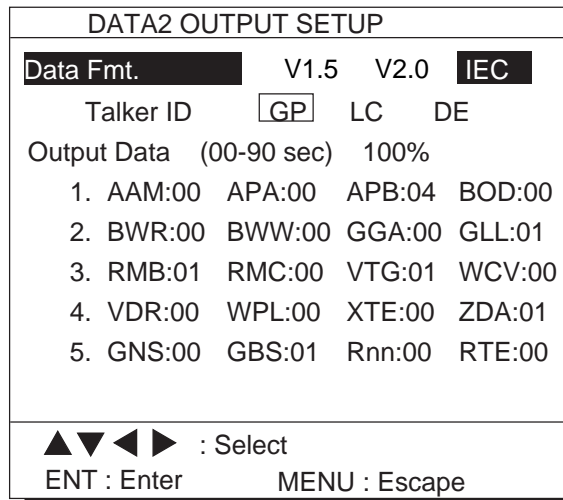
Figure 5-3 DATA 1, 3 OUTPUT SETUP menu

- 2) Press ▲ or ▼ to select Data Fmt.
- 3) Press ◀ or ▶ to select V1.5, V2.0 or IEC.
- 4) Press the [ENT] key. Talker ID appears in reverse video.
- 5) Press ◀ or ▶ to select GP, LC or DE.
- 6) Press the [ENT] key.
- 7) Enter Tx interval for each output data sentence in line 1. Tx interval is available in 00, 01, 02, 03, 04, 05, 06, 10, 15, 20, 30, 60, and 90 sec.
- 8) Press the [ENT] key.
- 9) Enter Tx interval for each output data sentence in lines 2 through 5. Press the [ENT] key after setting each line.

In great circle navigation, BWC and WNC are output but BWR and WNR are not. In rhumb line navigation, BWR and WNR are output but BWC and WNC are not. The total data output are shown by percentage on the third line.

### DATA 2 output setting

1) Press [MENU], [9] and [4]. The DATA 2 OUTPUT SETUP menu appears.



Setting shown here are default settings.

Figure 5-4 DATA 2 OUTPUT SETUP menu

2) Follow the procedure for setting DATA 1 output.

### DATA 3 output setting

The DATA 3 can output NMEA 0183 (V1.5/V2.0) /IEC 61162-1 data or log pulse by selecting inner jumper wires. For NMEA 0183 (V1.5/V2.0) /IEC 61162-1, the same signal of DATA 1 is output from DATA 3.

#### Selection of NMEA0183 or log pulse

Output data NAV board	NMEA 0183 (V1.5/ V2.0)/IEC 61162-1 (default setting)	Log pulse
JP4 (2 pcs.)	ON	OFF
JP5 (3 pcs.)	OFF	ON

#### Rate of log pulse output

500 mA Max.  
50 VDC

#### Procedure for setting of log pulse rate

- 1) Press [MENU], [9] and [3].
- 2) Press ▲ or ▼ to select DATA 3. Log Pulse.
- 3) Press ◀ or ▶ to select log pulse for external equipment; 200 ppm or 400 ppm.
- 4) Press the [ENT] key.
- 5) Press the [ESC] key.



## Setting DATA 4 to Data Output

- 1) Press [MENU], [9] and [5]. The DATA 4 I/O SETUP menu appears.

DATA 4 I/O SETUP		1/2
<b>DATA 4. Level</b>	<b>RS232C</b>	RS422
Data	<input type="text" value="Out"/>	Com. <input type="text" value="DGPS"/>
To Next Page		
▲▼◀▶ : Select ENT : Enter      MENU : Escape		

Appears only when external DGPS receiver is used.

*Figure 5-5 DATA 4 I/O SETUP menu*

- 2) Press ▲ or ▼ to select DATA4. Level.
- 3) Press ◀ or ▶ to select level of external equipment; RS232C or RS422.
- 4) Press the [ENT] key.
- 5) Press ◀ or ▶ to select Out.
- 6) Press ▼ to select to Next Page. The DATA 4 I/O SETUP <out> menu appears.

DATA 4 I/O SETUP <Out>		2/2
To Previous Page		
<b>Data Fmt.</b>	V1.5	V2.0 <b>IEC</b>
Talker ID	<input type="text" value="GP"/>	LC DE
Output Data	(00-90 sec)	100%
1.	AAM:00 APA:00 APB:04 BOD:00	
2.	BWR:00 BWW:00 GGA:00 GLL:01	
3.	RMB:01 RMC:00 VTG:01 WCV:00	
4.	VDR:00 WPL:00 XTE:00 ZDA:01	
5.	GNS:00 GBS:01 Rnn:00 RTE:00	
ENT : Enter      MENU : Escape		

*Figure 5-6 DATA 4 I/O SETUP <out> menu*

- 7) Follow "DATA 1 output setting" from step 2.

### Setting DATA 4 to “COM.” (general data)

Waypoints and Routes data can be received from a personal computer, through the DATA 4 port.

- 1) Press [MENU], [9] and [5].
- 2) Press ▲ or ▼ to select DATA4. Level.
- 3) Press ◀ or ▶ to select level of personal computer; RS232C or RS422.
- 4) Press the [ENT] key.
- 5) Press ▶ to select Com.
- 6) Press ▼ to select To Next Page. The DATA 4 I/O SETUP <Com.> menu appears.

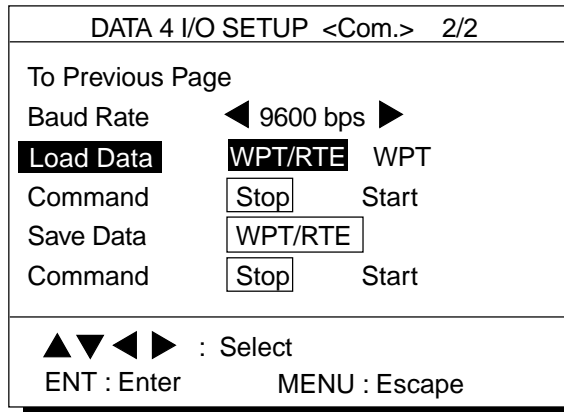


Figure 5-7 DATA 4 I/O SETUP <Com.> menu

- 7) Press ▲ or ▼ to select Baud Rate.
- 8) Press ◀ or ▶ to select baud rate; 4800bps, 9600bps or 19200bps.
- 9) Press the [ENT] key.
- 10) Press ◀ or ▶ to select WPT/RTE.
- 11) Press ▼ to select Command. Stop, on the same line as Command, appears in reverse video.
- 12) Press ▶ to select Start. The message shown in Figure 5-8 appears.

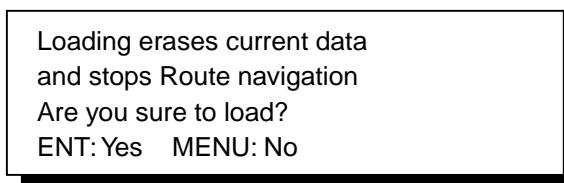


Figure 5-8

- 13) Press the [ENT] key. The message shown in Figure 5-9 appears while data is being loaded.



Figure 5-9

- 14) Output data from the computer. When loading data is completed, the cursor shifts to Stop.
- 15) Press the [ESC] key.

## Setting DATA 4 to DGPS

An external DGPS receiver can be connected to the DATA 4 port.

Follow the procedure below to setup the GP-90 according to the specifications of the DGPS receiver.

- 1) Press [MENU], [9] and [5].
- 2) Press ▲ or ▼ to select Level.
- 3) Press ◀ or ▶ to select level; RS232C or RS422.
- 4) Press the [ENT] key.
- 5) Press ◀ or ▶ to select DGPS.
- 6) Press ▼ to select To Next Page.

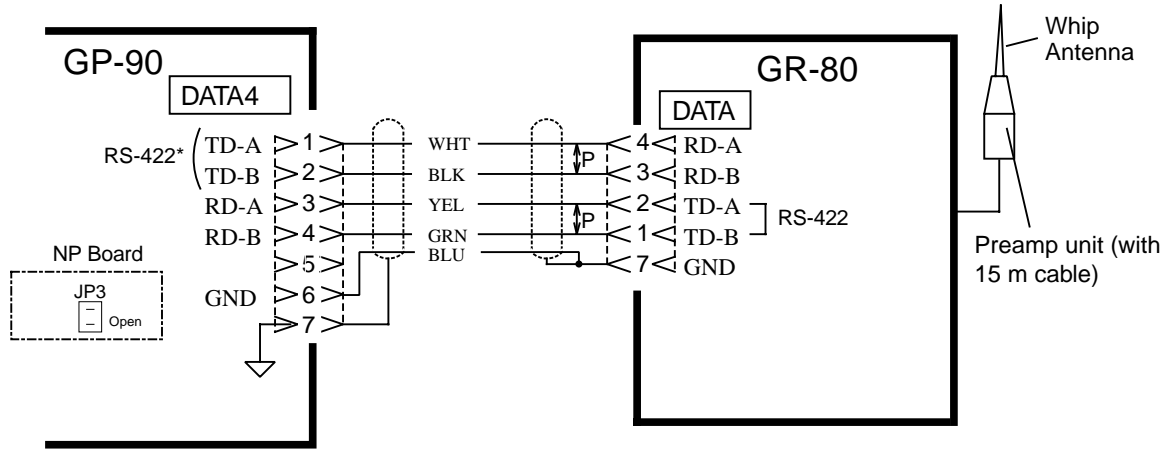
DATA 4 I/O SETUP <DGPS>		2/2
To previous Page		
First Bit	MSB	LSB
Parity	EVEN	ODD NONE
Stop Bit	1	2
Baud Rate	4800	9600
▲▼◀▶ : Select		
ENT: Enter MENU: Escape		

Figure 5-10 DATA 4 I/O SETUP <DGPS> menu

- 7) Press ▲ or ▼ to select First Bit.
- 8) Press ◀ or ▶ select first bit; MSB or LSB.
- 9) Press ▼ to select Parity.
- 10) Press ◀ or ▶ to select parity bit; EVEN, ODD or NONE.
- 11) Press ▼ to select Stop Bit.
- 12) Press ◀ or ▶ to select stop bit; 1 or 2.
- 13) Press ▼ to select Baud Rate.
- 14) Press ◀ or ▶ to select baud rate; 4800 or 9600.
- 15) Press the [ENT] key.
- 16) Press the [ESC] key.

# 6. OPTIONAL DGPS

## Beacon Receiver Set GR-80



\* This connection is required for L/L Auto mode of GR-80.

When the GP-90 is connected with Beacon Receiver GR-80, do the setting as follows.

Signal level	RS-422 *1
First Bit	LSB
Parity	NONE
Stop Bit	1
Baud Rate	4800 or 9600 *1

\*1: Coincide with the setting of the Beacon Receiver GR-80.

Refer to page 17 for DGPS setup.

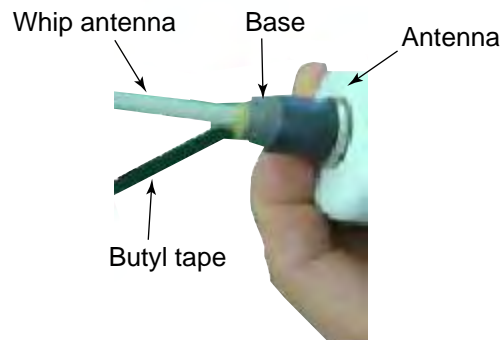
# 7. TAPING ANTENNA UNIT GPA-018S

After inserting the whip antenna to the antenna base of GPA-018S, tape the antenna base and whip antenna with self-vulcanizing tape and vinyl tape to reinforce the whip antenna.

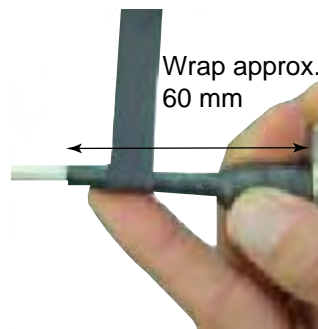
1. Wrap the antenna junction point with butyl 15 tape or the equivalent.

### How to wrap

- 1) Pull the tape to be about two times in length and wind it up, overlapping by 1/2 the width of the tape.
- 2) Wrap from bottom to top, i.e., from right to left as in the picture below.



- 3) Wrap the tape from the base to a point about 60 mm, and then back to the base. Keep tension on edge of tape, using finger to hold tape. Then, squeeze edges of tape with thumb and index finger.



2. Completely cover the butyl rubber tape with white vinyl tape, wrapping from the base to the last wind of butyl tape and then back to the base.

### How to wrap

- 1) Being careful not to pull the tape too tightly, wind tape, overlapping by approx. 1/3 of tape width.
- 2) Squeeze edges of tape with thumb and index finger.



# PACKING LIST

GP-90-\*\*-\*\*1-\*\*-\*\*/GP-90-DUAL-\*\*-\*\*1-\*\*-\*\*

20AX-X-9851-4

1/1

NAME	UNIT	OUTLINE	DESCRIPTION/CODE	Q'TY
受信演算部			GP-90-E-N	1
DISPLAY UNIT			000-041-054 **	
空中線部			GPA-019S	1
ANTENNA UNIT			000-142-545 **	(*1)
空中線部			GPA-018S	1
ANTENNA UNIT			000-041-895 **	(*1)
空中線部			GPA-017S	1
ANTENNA UNIT			000-040-537 **	(*1)

## 予備品

SPARE PARTS		SP20-00500
ヒューズ		FGB0-A 2A AC125V
FUSE		000-549-062

## 工率材料

INSTALLATION MATERIALS		CP20-01101
+トラスタップネジ 1種		5X20 SUS304
SELF-TAPPING SCREW		000-802-081

## 空中線部工材

ANTENNA UNIT INSTALLATION MATERIALS		CP20-01111
取付補助金具		20-007-3012-1
INSTALLING SPACER		100-183-271
ハ 17°		20-007-3011-2
PIPE		100-183-262

1.コード番号末尾の["\*"]は、選択品の代表コード番号を表します。  
CODE NUMBER ENDED BY "\*" INDICATES THE NUMBER OF TYPICAL MATERIAL.

2.(\*1)の空中線部は仕様により決定されます。  
ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

NAME	OUTLINE	DESCRIPTION/CODE	Q'TY
ハ 14°ケーブルクランプ		NO.6348 SUS303	2
HOSE CLAMP		000-805-906	

## その他工材 OTHER INSTALLATION MATERIALS

ケーブル組品		TNC-PS-3D-15	20S0216	1
ANTENNA CABLE ASSY.		000-133-670		(*2)
ケーブル組品MJ		MJ-A2SPF0014-030C		1
POWER CABLE		000-158-000		
ケーブル組品MJ		MJ-A6SPF0003-050C		1
SIGNAL CABLE ASSEMBLY		000-154-054		

## 図書

DOCUMENT		DOCUMENT	Q'TY
装備要領書		1MJ-4427*-*	1
INSTALLATION MANUAL		000-147-467 **	
操作要領書		0SJ-4427*-*	1
OPERATOR'S GUIDE		000-147-465 **	
取扱説明書		0MJ-4427*-*	1
OPERATOR'S MANUAL		000-147-463 **	

3.(\*2)のアンテナケーブル組品は、有り・無しの様子が有ります。  
AVAILABLE WITH OR WITHOUT ANTENNA UNIT.

A-1

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)

20AX-X-9851

# PACKING LIST

GP-90-\*\*-0-\*\*-\*/GP-90-DUAL-\*\*-\*0-\*\*-\*

20AX-X-9852-4

1/1

NAME	UNIT	OUTLINE	DESCRIPTION/CODE	Q'TY
<b>ユニット</b>				
受信演算部			GP-90-E-N	1
DISPLAY UNIT			000-041-054 **	
空中線部			GPA-019S	1
ANTENNA UNIT			000-142-545 **	(*1)
空中線部			GPA-018S	1
ANTENNA UNIT			000-041-895 **	(*1)
空中線部			GPA-017S	1
ANTENNA UNIT			000-040-537 **	(*1)
<b>予備品</b>				<b>SP20-00500</b>
ヒューズ			FGB0-A 2A AC125V	3
FUSE			000-549-062	
<b>工率材料</b>				<b>CP20-01101</b>
+トラスタップネジ 1種			5X20 SUS304	4
SELF-TAPPING SCREW			000-802-081	
<b>その他工材</b>				<b>OTHER INSTALLATION MATERIALS</b>
ケーブル組品			TNC-PS-3D-15 20S0216	1
ANTENNA CABLE ASSY.			000-133-670	(*2)
ケーブル組品MJ			MJ-A2SPF0014-030C	1
POWER CABLE			000-158-000	

1.コード番号末尾の["\*"]は、選択品の代表コード番号を表します。  
CODE NUMBER ENDED BY "\*" INDICATES THE NUMBER OF TYPICAL MATERIAL.

2.(\*1)の空中線部は仕様により決定されます。  
ANTENNA UNIT HAS BEEN DETERMINED BY SPECIFICATION.

(略図の寸法は、参考値です。 DIMENSIONS IN DRAWING FOR REFERENCE ONLY.)


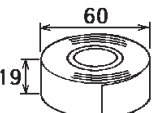
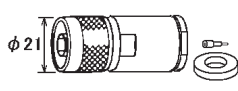
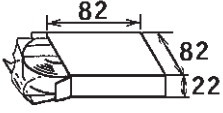
NAME	OUTLINE	DESCRIPTION/CODE	Q'TY
ケーブル組品MJ		MJ-A6SPF0003-050C	1
SIGNAL CABLE ASSEMBLY		000-154-054	
<b>図書</b>		<b>DOCUMENT</b>	
取扱説明書		OMJ-4427*-*	1
OPERATOR'S MANUAL		000-147-463 **	
操作要領書		OSJ-4427*-*	1
OPERATOR'S GUIDE		000-147-465 **	
装備要領書		IMJ-4427*-*	1
INSTALLATION MANUAL		000-147-467 **	

3.(\*2)のアンテナケーブル組品は、有り・無し仕様が有ります。  
AVAILABLE WITH OR WITHOUT ANTENNA UNIT.

Antenna Cable Set  
 CP20-01700 (004-372-110)  
 CP20-01710 (004-372-120)



**FURUNO**

CODE NO.	004-372-420-00	20AG-X-9405 -4
TYPE	CP20-01701	1/1

工事材料表 INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	変換ケーブル組品 CONVERT CABLE ASSY.		NJ-TP-3DXV-1 CODE NO. 000-123-809-00	2	
2	ビニルテープ VINYL TAPE		N0360 0.2X19X10000 CODE NO. 000-835-215-00	1	
3	コネクタ(N) CONNECTOR		N-P-8DFB-CF CODE NO. 000-156-918-10	1	
4	絶縁テープ SELF-BONDING TAPE		Uテープ 0.5X19X5M Uテープ 0.5X19X5M CODE NO. 000-165-833-10 000-800-985-00	1	

**FURUNO**

CODE NO.		20AG-X-9404 -2
TYPE		1/1

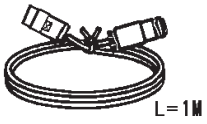
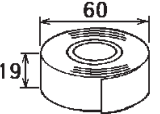
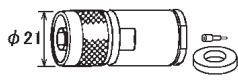
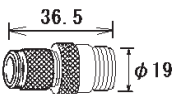
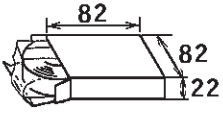
工事材料表 INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	アンテナケーブル組品 ANTENNA CABLE ASSY.		GP-80, GP-90, SC-55, GP-3500/F, GP-1850, GP-1650, FA-100, FA-150, GP-1640/F, SC-60/120, GD/GP- 8D-FB-CV *30M* CODE NO. 000-111-547-00	1	選択 TO BE SELECTED
2	アンテナケーブル組品 CABLE ASSY.		8D-FB-CV *50M* CODE NO. 000-117-599-00	1	選択 TO BE SELECTED



Antenna Cable Set  
 CP20-02700 (004-381-160)  
 CP20-02710 (004-381-170)



## FURUNO

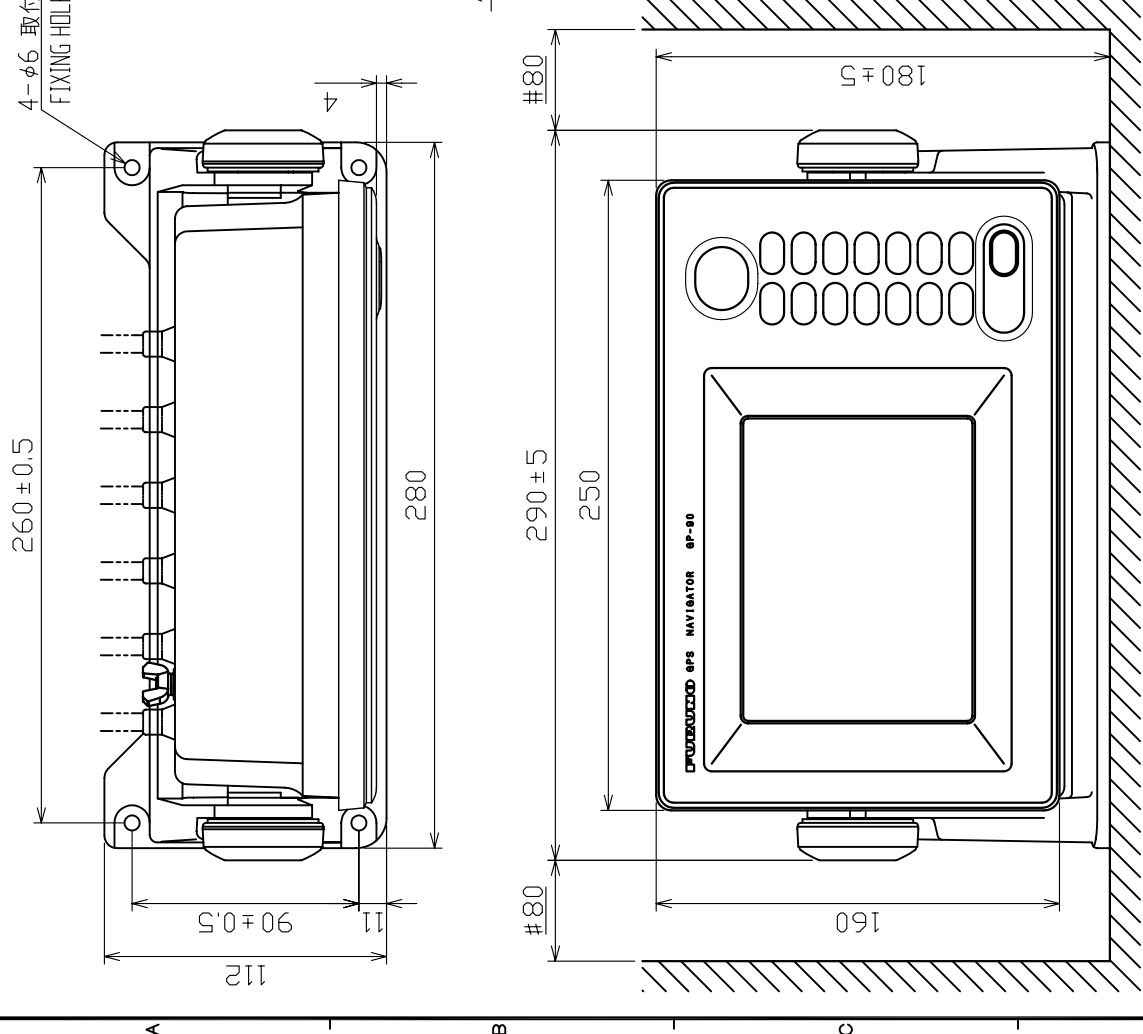
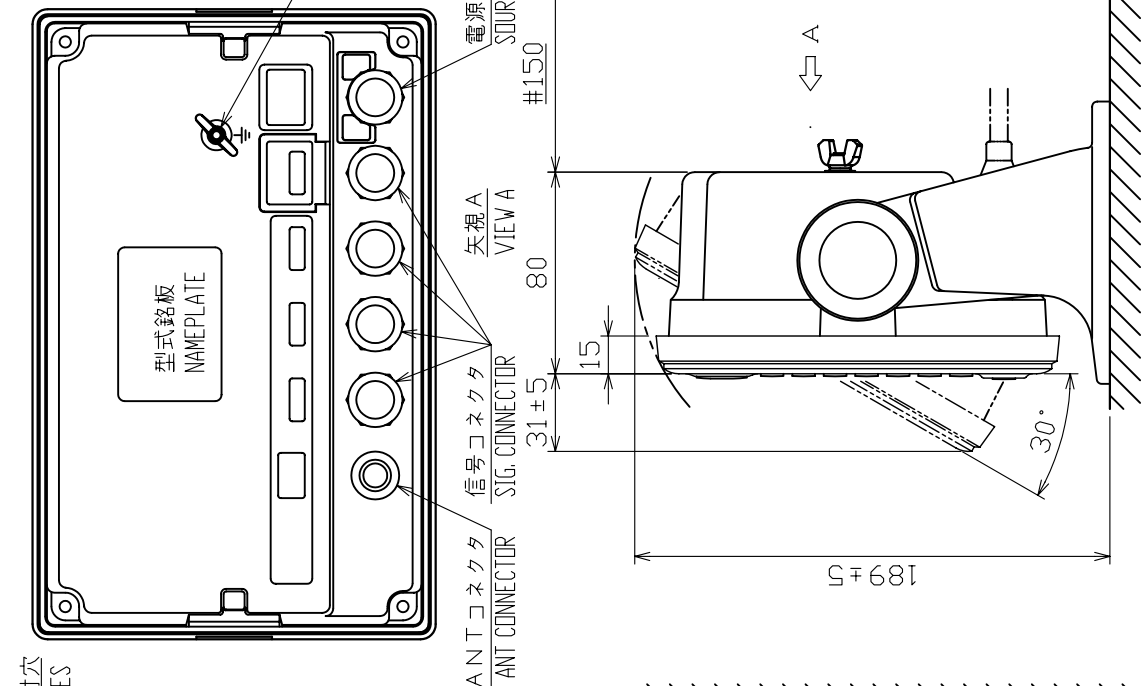
CODE NO.	004-381-190-00	20AX-X-9401 -5
TYPE	CP20-02701	1/1

工事材料表					
INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	変換ケーブル組品 CONVERT CABLE ASSY.		NJ-TP-3DXV-1 CODE NO. 000-123-809-00	1	
2	ビニルテープ VINYL TAPE		N0360 0.2X19X10000 CODE NO. 000-835-215-00	1	
3	コネクタ(N) CONNECTOR		N-P-8DFB-CF CODE NO. 000-156-918-10	1	
4	コネクタ CONNECTOR		TNCP-NJ CODE NO. 000-156-599-10	1	
5	絶縁テープ SELF-BONDING TAPE		Uテープ 0.5X19X5M CODE NO. 000-165-833-10 000-800-985-00	1	

## FURUNO

CODE NO.		20AG-X-9404 -2
TYPE		1/1

工事材料表					
INSTALLATION MATERIALS					
番号 NO.	名称 NAME	略図 OUTLINE	型名/規格 DESCRIPTIONS	数量 Q'TY	用途/備考 REMARKS
1	アンテナケーブル組品 ANTENNA CABLE ASSY.		GP-80, GP-90, SC-55, GP-3500/F, GP-1850, GP-1650, FA-100, FA-150, GP-1640/F, SC-60/120, GD/GP- 8D-FB-CV *30M* CODE NO. 000-111-547-00	1	選択 TO BE SELECTED
2	アンテナケーブル組品 CABLE ASSY.		8D-FB-CV *50M* CODE NO. 000-117-599-00	1	選択 TO BE SELECTED



寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
L ≤ 50	± 1.5
50 < L ≤ 100	± 2.5
100 < L ≤ 500	± 3

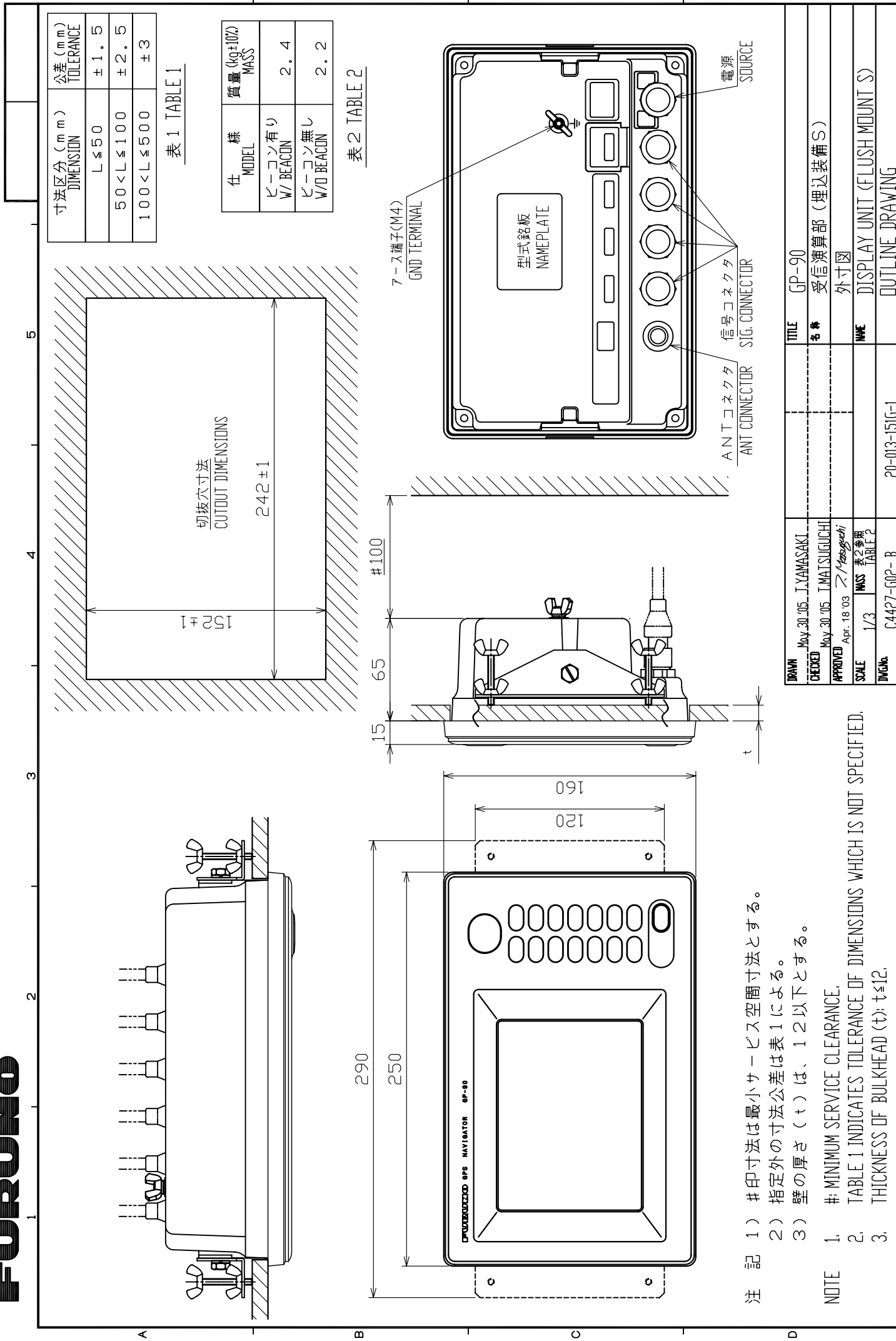
表 1 TABLE 1

仕様 MODEL	質量 (kg±10%) MASS
ビーコン有り W/ BEACON	2.4
ビーコン無し W/O BEACON	2.2

表 2 TABLE 2

- 注記 1) #印寸法は最小サービスマン間寸法とする。  
 2) 指定外の寸法公差は表 1 による。  
 3) 取付用ネジは +トラスターピンネジ呼び径 5 × 2.0 を使用のこと。
- NOTE 1. # MINIMUM SERVICE CLEARANCE.  
 2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 3. USE SELF-TAPPING SCREWS 5x2.0 FOR FIXING THE UNIT.

DRAWN May. 30 '05	T. YAMASAKI	TITLE GP-90
CHECKED May. 30 '05	T. MATSUGUCHI	名称 受信演算部 (卓上装備)
APPROVED Apr. 18 '03	→ / Masayoshi	外寸図
SCALE 1/3	表 2 参照 TABLE 2	NAME DISPLAY UNIT (TABLETOP MOUNT)
DWG No.	C4427-G01-B	20-013-150G-1 OUTLINE DRAWING



寸法区分 (mm) DIMENSION TOLERANCE

L ≤ 50	± 1.5
50 < L ≤ 100	± 2.5
100 < L ≤ 500	± 3

表 1 TABLE 1

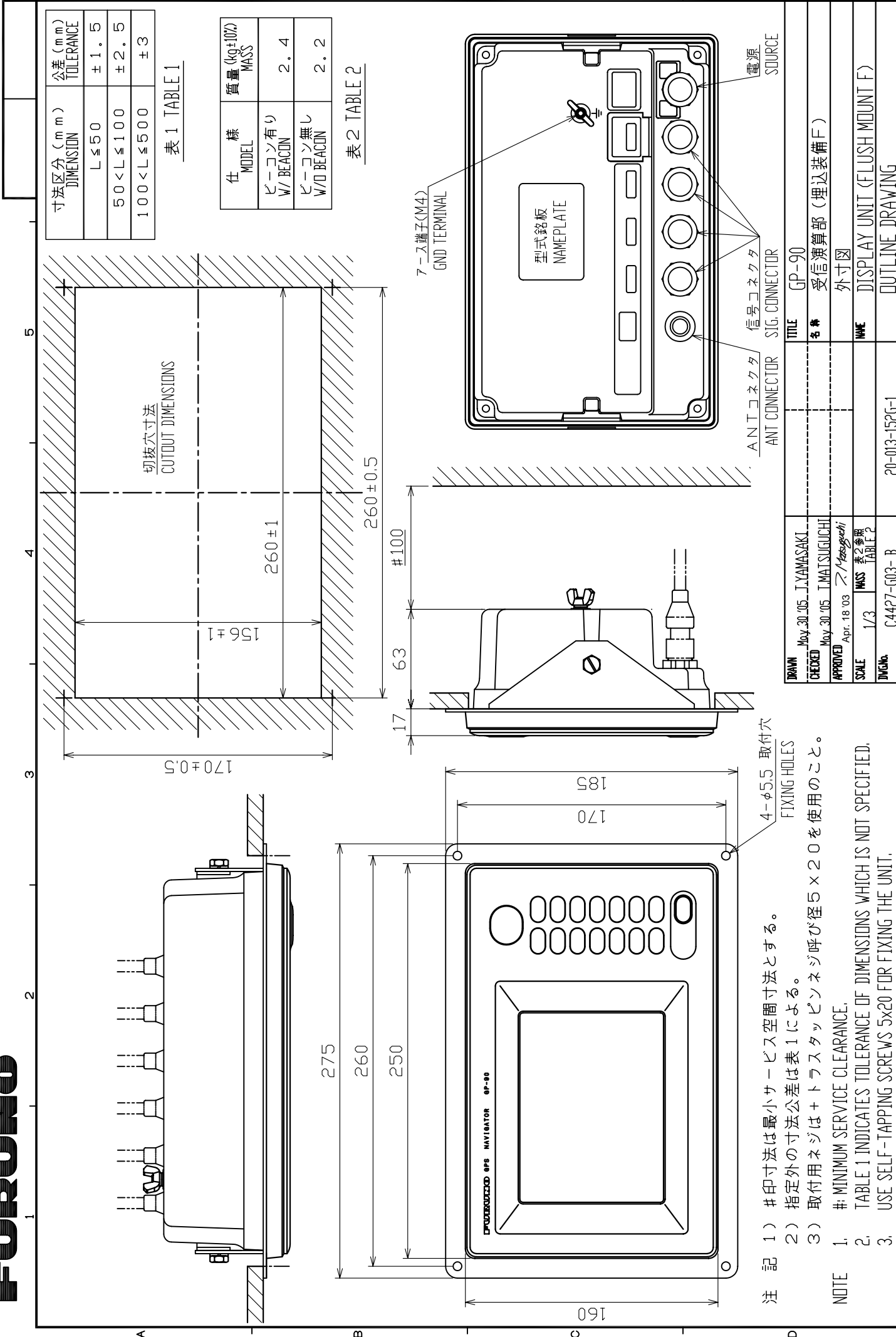
仕様 MODEL 質量 (kg±10%) MASS

ビーコン有り W/ BEACON	2.4
ビーコン無し W/O BEACON	2.2

表 2 TABLE 2

- 注記 1) # 印寸法は最小サービス空間寸法とする。  
 2) 指定外の寸法公差は表 1 による。  
 3) 壁の厚さ (t) は、1/2 以下とする。
- NOTE 1. # MINIMUM SERVICE CLEARANCE.  
 2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.  
 3. THICKNESS OF BULKHEAD (t): t ≤ 1/2.

DRAWN	May.30.'05	I.YAMASAKI	TITLE	GP-90
CHECKED	May.30.'05	I.MAISUGUCHI	名称	受信演算部 (埋込装備 S)
APPROVED	Apr.18.'03	Y.Masuyoshi		外寸図
SCALE	1/3	MASS 表 2 参照 TABLE 2	NAME	DISPLAY UNIT (FLUSH MOUNT S)
DWG.No.	C4427-G02-B			OUTLINE DRAWING



寸法区分 (mm) DIMENSION TOLERANCE

L ≤ 50	± 1.5
50 < L ≤ 100	± 2.5
100 < L ≤ 500	± 3

表 1 TABLE 1

仕様 MODEL 質量 (kg±10%) MASS

ビーコン有り W/ BEACON	2.4
ビーコン無し W/O BEACON	2.2

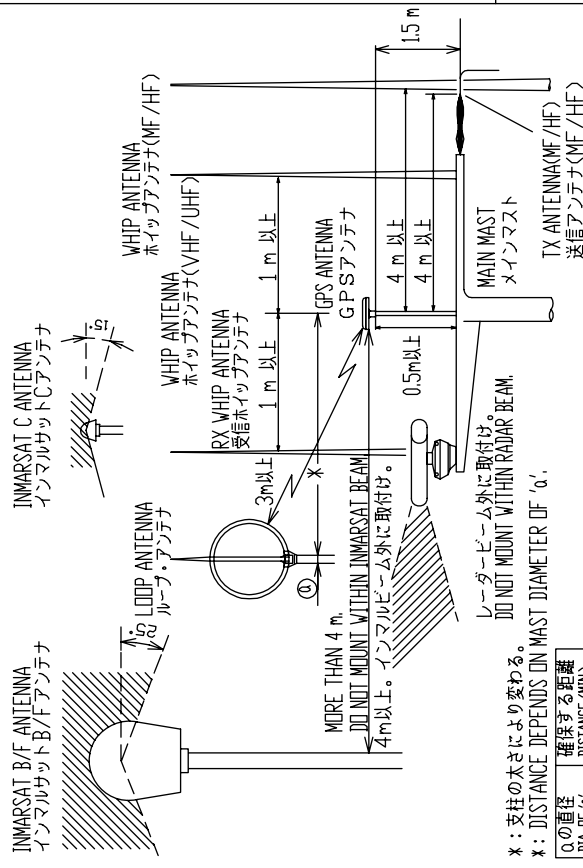
表 2 TABLE 2

- 注記
- 1) #印寸法は最小サービス空間寸法とする。
  - 2) 指定外の寸法公差は表 1 による。
  - 3) 取付用ネジは + トラスタックピンネジ呼び径 5 × 2.0 を使用のこと。
- NOTE
1. # MINIMUM SERVICE CLEARANCE.
  2. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.
  3. USE SELF-TAPPING SCREWS 5x2.0 FOR FIXING THE UNIT.

DRAWN	May. 30 '05	I. YAMASAKI	TITLE	GP-90
CHECKED	May. 30 '05	I. MAISUGUCHI	名称	受信演算部 (埋込装備 F)
APPROVED	Apr. 18 '03	Y. Masuyoshi	外寸図	
SCALE	1/3	表 2 参照 TABLE 2	NAME	DISPLAY UNIT (FLUSH MOUNT F)
DWG No.	C4427-603-B	20-013-152G-1	OUTLINE DRAWING	

## 取付位置 MOUNTING LOCATION

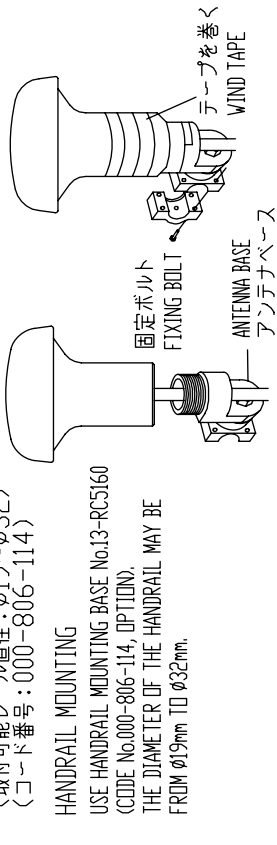
他の機器のアンテナから下の図の距離以上離す。  
THIS FIGURE SHOWS THE SEPARATION DISTANCES FROM OTHER ANTENNAS TO AVOID MUTUAL INTERFERENCE.



\* : 支柱の太さにより変わる。  
\* : DISTANCE DEPENDS ON MAST DIAMETER OF "a".

径の直径 DIA. OF "a"	確保する距離 DISTANCE (MIN)
10 cm	1.5 m
30 cm	3 m

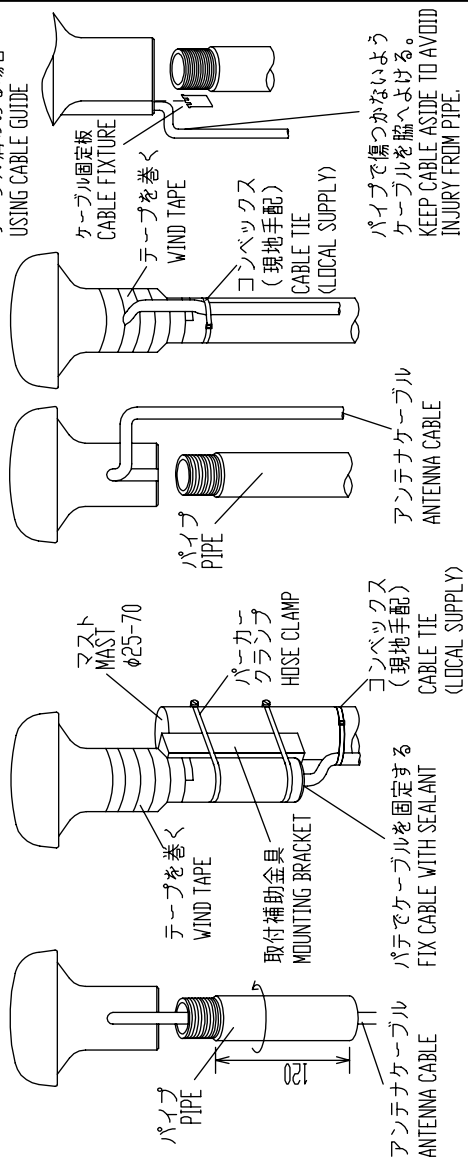
## B) スタンションやバルビットにつけるとき レール用アンテナベース No.13-RC5160 (取付可能レール直径: φ19~φ32) (コード番号: 000-806-114)



注記 1) パイプやアンテナベースはアンテナユニットにねじ込んだ後に固定する。  
2) アンテナを固定するときはパイプ(アンテナベース)をアンテナにねじ込むこと。  
アンテナ側をねじるとコネクタ部やケーブルに無理がかかり、故障の原因となる。

NOTE 1. FASTEN PIPE(ANTENNA BASE) TO ANTENNA UNIT FIRST THEN FIX THEM TO MAST OR HANDRAIL.  
2. WHEN FIXING ANTENNA, TURN PIPE OR ANTENNA BASE, NOT THE ANTENNA.  
TURNING THE ANTENNA MAY TWIST THE CABLE AND PLACE STRESS ON CONNECTOR.

## A) マストへの取付け MAST MOUNTING a) マスト取付金具CP20-01111(工事材料)でマストに固定する。 USE MAST MOUNTING KIT CP20-01111.

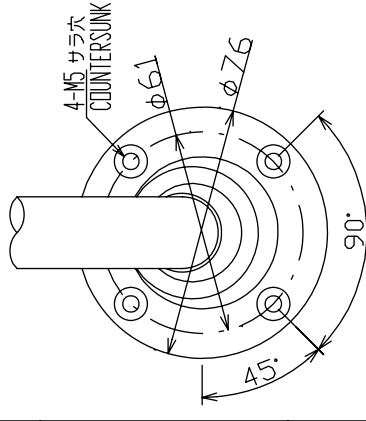


b) パイプのみを使うとき  
USE A PIPE ONLY.

## C) 取付ける場所が傾斜しているとき ANTENNA BASE MOUNTING オプションのアンテナベースを使う。 USE OPTIONAL ANTENNA BASE.

傾斜 INCLINATION	傾斜角 32° - 65°	傾斜角 65° - 98°
準備方法 MOUNTING METHOD	直型アンテナベース RIGHT ANGLE ANTENNA BASE No.13-0A330 000-803-239	L型アンテナベース L-TYPE ANTENNA BASE No.13-0A330 000-803-240
アンテナ ベース型式 ANT. BASE TYPE コード番号 CODE No.		

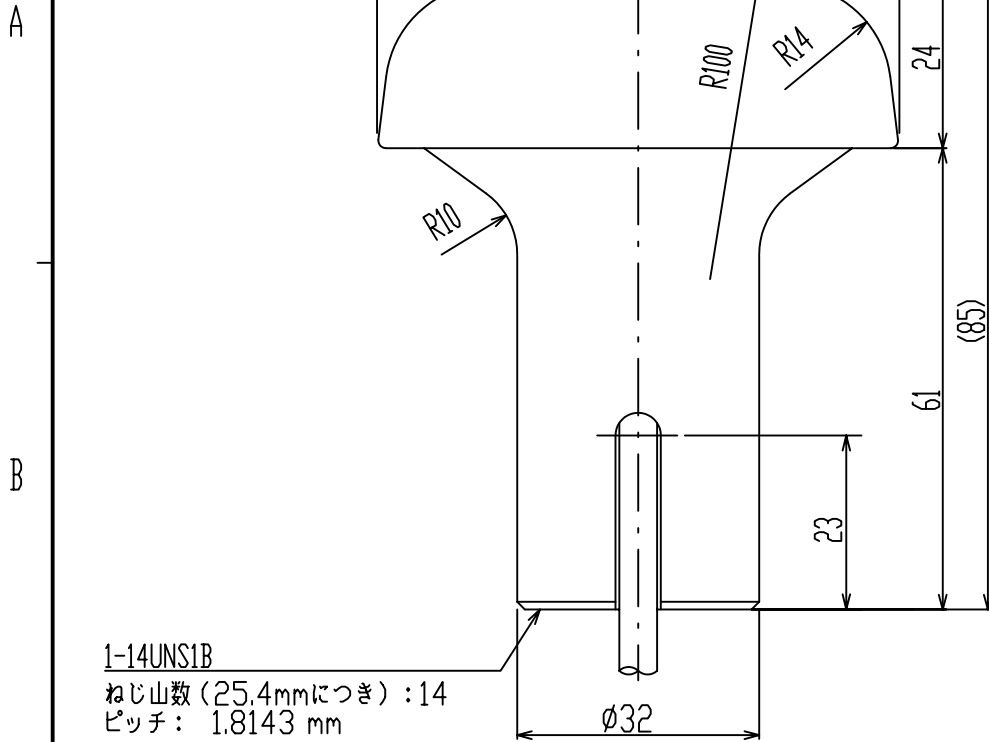
## アンテナベース基部 MOUNTING DIMENSIONS OF ANTENNA BASE.



DRAWN CHECKED APPROVED SCALE DWG.No.	Dec.14_'05 TAKAHASHI.T Y. Hatai MASS C4384-Y01-E	Dec.14_'05 TAKAHASHI.T Y. Hatai MASS C4384-Y01-E	Dec.14_'05 TAKAHASHI.T Y. Hatai MASS C4384-Y01-E
TITLE	GPA series	名称	空中線部
NAME	ANTENNA UNIT	装備要領図	ANTENNA UNIT
INSTALLATION PROCEDURE			ANTENNA UNIT

表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$



1-14UNS1B

ねじ山数 (25.4mmにつき) : 14  
 ピッチ : 1.8143 mm  
 オネジ有効長さ : 24.17 mm  
 オネジ有効径 : 19 mm以上

THREAD PER 25.4mm (1 INCH): 14  
 PITCH: 1.8143 mm  
 THREAD LENGTH: 24.17 mm  
 PITCH DIAMETER: 19 mm OR MORE

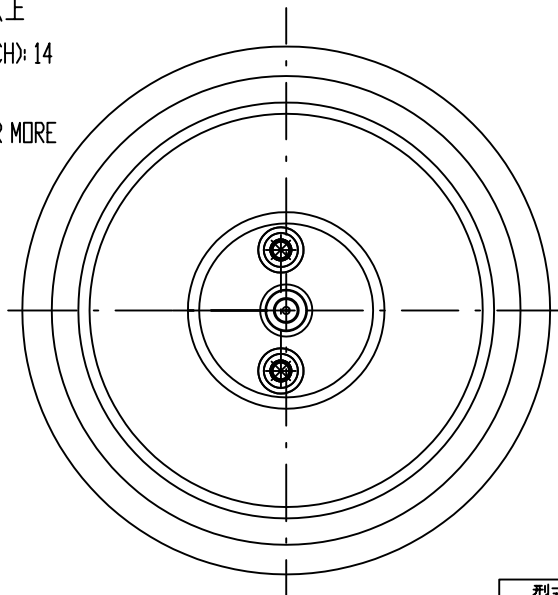


表2 TABLE 2

型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量(kg±10%) MASS
GPA-017	10	TNC-P-3	0.6
GPA-017S	0.2	TNC-J-3	0.15

注記  
 指定外の寸法公差は表1による。

NOTE  
 TABLE 1 INDICATES TOLERANCE OF DIMENSIONS WHICH IS NOT SPECIFIED.

DRAWN Sep. 22 '05 T.YAMASAKI	TITLE GPA-017/017S
CHECKED Sep. 22 '05 T.TAKENO	名称 空中線部
APPROVED Sep. 29 '05 T.Matsuyoshi	外寸図
SCALE 1/1 MASS TABLE 2 表2参照	NAME ANTENNA UNIT
DWG.No. C4384-G04-K	OUTLINE DRAWING

表1 TABLE 1

寸法区分 (mm) DIMENSION	公差 (mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

\* 1.2m以下のホイップを使用のこと。  
決してこれ以上のものを使用しないこと。  
\* USE 1.2 m OR SHORTER WHIP.  
DO NOT USE LONGER ONE.

アース線  
GND WIRE (IV-2sq.)  
(造船所手配)  
(SHIPYARD SUPPLY)

シール剤を  
塗布する  
APPLY SILICONE  
SEALANT

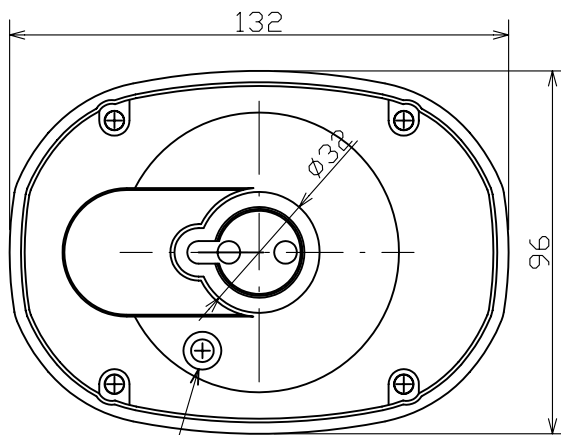
アースボルト  
(造船所手配)  
M6-M8  
STUD BOLT  
(SHIPYARD SUPPLY)

マスト  
MAST

1-14UNS1B

ねじ山数(25.4mmにつき): 14  
ピッチ: 1.8143 mm  
オネジ有効長さ: 19 mm以上  
オネジ有効径: 24.17 mm

THREADS PER INCH (25.4mm): 14  
PITCH: 1.8143 mm  
THREAD LENGTH: 19 mm OR MORE  
PITCH DIAMETER: 24.17 mm



アース端子  
GND TERMINAL

表2 TABLE 2

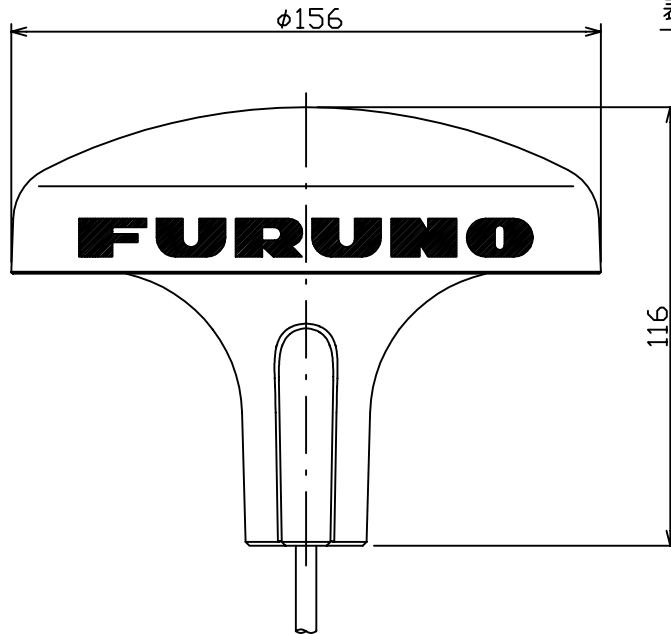
型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量(kg±10%) MASS
GPA-018	10	TNC-P-3	0.79
GPA-018S	0.2	TNC-J-3	0.35

注記 1) 指定なき寸法公差は表1による。  
NOTE 1. TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Mar. 9 '05 I.YAMASAKI	TITLE GPA-018/018S
CHECKED Mar. 9 '05 H.HAYASHI	名称 空中線部
APPROVED Feb. 19, '03 Y. Kimura	外寸図
SCALE 1/2 MASS TABLE 2 表2参照	NAME ANTENNA UNIT
DWG. No. C4385-G01-L	OUTLINE DRAWING

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
$L \leq 50$	$\pm 1.5$
$50 < L \leq 100$	$\pm 2.5$
$100 < L \leq 500$	$\pm 3$

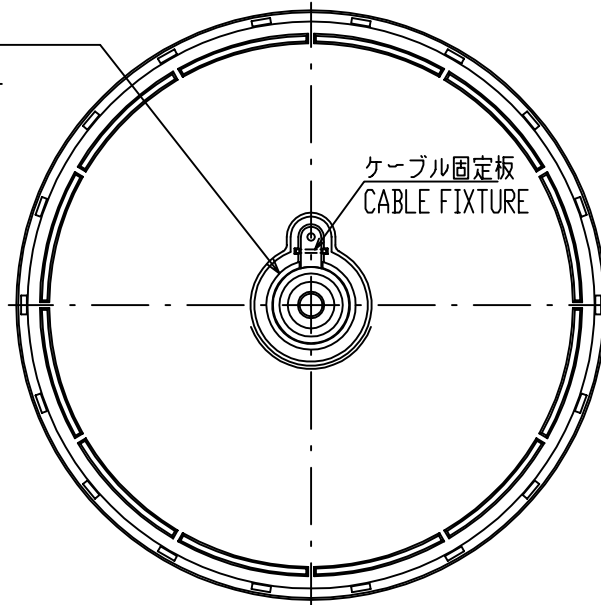
表1 TABLE 1



1-14UNS1B

ねじ山数(25.4mmにつき): 14  
 ピッチ: 1.8143 mm  
 オネジ有効長さ: 15.17 mm  
 オネジ有効径: 24.17 mm

THREAD PER 25.4mm (1 INCH): 14  
 PITCH: 1.8143 mm  
 THREAD LENGTH: 15.17 mm  
 PITCH DIAMETER: 24.17 mm



型式 TYPE	ケーブル長(m) CABLE LENGTH	プラグ PLAG	質量 (kg±10%) MASS
GPA-019	10	TNC-P-3	1.0
GPA-019S	0.2	TNC-J-3	0.54

表2 TABLE 2

注記: 指定外の寸法公差は表1による

NOTE: TABLE 1 INDICATES TOLERANCE OF DIMENSIONS.

DRAWN Feb. 19 '03 T.YAMASAKI	TITLE GPA-019/019S
CHECKED Feb. 19 '03 Y.KIMURA	名称 空中線部
APPROVED Feb. 19, '03 <i>Y. Kimura</i>	外寸図
SCALE 1/2 MASS TABLE 2 表2参照	NAME ANTENNA UNIT
DWG. No. C4400-G01-F	OUTLINE DRAWING



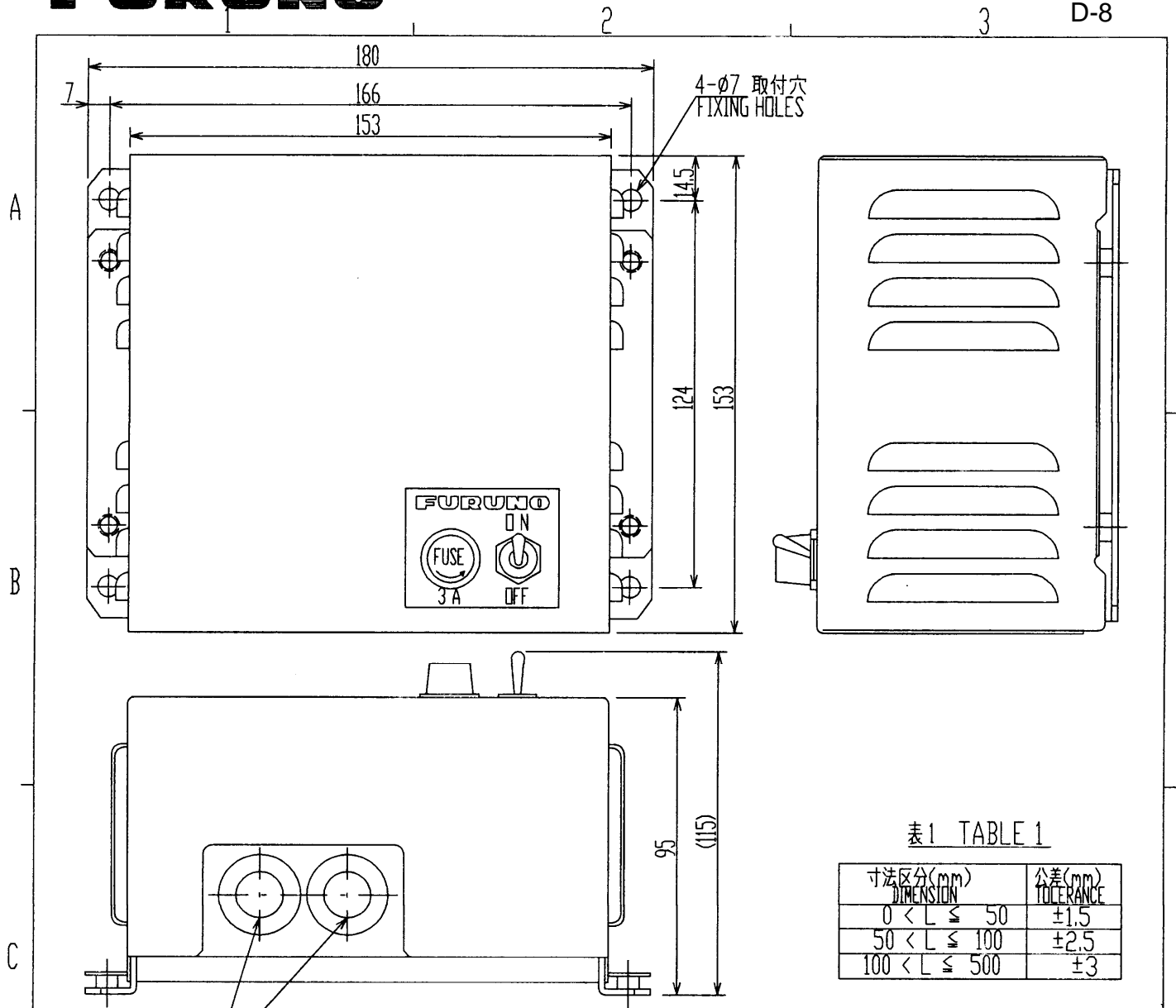


表1 TABLE 1

寸法区分(mm) DIMENSION	公差(mm) TOLERANCE
0 < L ≤ 50	±1.5
50 < L ≤ 100	±2.5
100 < L ≤ 500	±3

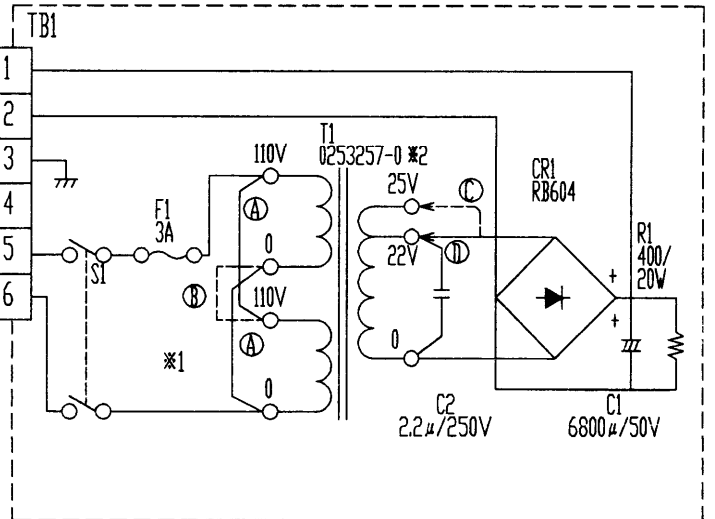
ケーブル導入口  
CABLE ENTRY

24VDC  
OUTPUT  
(2.5A max)

AC INPUT

入力電圧に応じて接続を変更して下さい。  
CHANGE TAP CONNECTIONS DEPENDING ON SUPPLY VOLTAGE.

	AC100V	AC110/ 115V	AC220V	AC230V
※1	Ⓐ	Ⓐ	Ⓑ	Ⓑ
※2	Ⓒ	Ⓓ	Ⓓ	Ⓓ



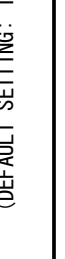
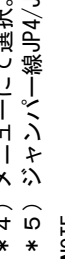
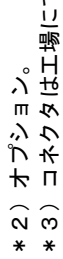
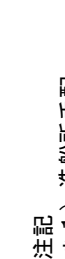
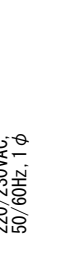
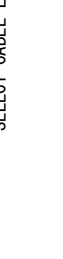
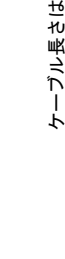
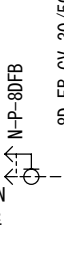
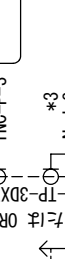
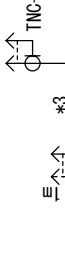
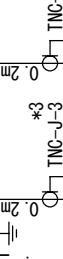
DRAWN Sep. 14 '01 T.YAMASAKI	TITLE PR-62
CHECKED S. Y. K.	名称 整流器
APPROVED S. Y. K.	外寸図
SCALE 1/2 MASS ±10% 3 kg	NAME RECTIFIER
DWG.No. C5003-034-E	OUTLINE DRAWING

4

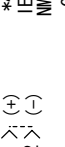
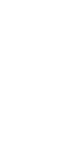
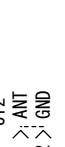
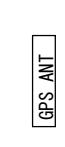
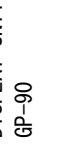
3

2

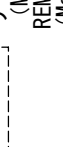
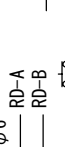
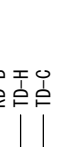
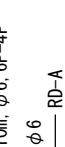
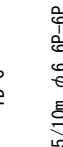
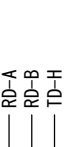
### 空中線部 ANTENNA UNIT



### 受信演算部 DISPLAY UNIT GP-90



### 受信演算部 DISPLAY UNIT GP-90



入出力データ、センテンスについては  
装備要領書を参照のこと。  
REFER TO INSTALLATION MANUAL FOR  
USING I/O DATA SENTENCES.

リモートイベントスイッチ  
(MOBスイッチ)  
REMOTE EVENT SWITCH  
(Man Over Board SWITCH)

外部GPSパソコン受信機またはパソコンを接続するときは  
装備要領書を参照のこと。  
REFER TO INSTALLATION MANUAL TO CONNECT EXTERNAL  
DGPS BEACON RECEIVER OR PC.

### 注記

- \*1) 造船所手配。
- \*2) オプション。
- \*3) コネクタは工場にて取付済。
- \*4) メニューにて選択。
- \*5) ジャンパー線JP4/JP5 (NP基板)にて選択 (工場設定: IEC61162-1/NMEA0183)。

### NOTE

- \*1. SHIPYARD SUPPLY
- \*2. OPTION
- \*3. CONNECTOR PLUG FITTED AT FACTORY.
- \*4. SELECTED ON MENU
- \*5. SELECTED BY JUMPER WIRE JP4/JP5 ON NP BOARD (DEFAULT SETTING: IEC61162-1/NMEA0183).

DRAWN	Apr. 17, '06	E. MIYOSHI	TITLE	GP-90
CHECKED		TAKAHASHI, T	名称	GPS航法装置
APPROVED		Y. Hatai		相互結線図
SCALE		MASS kg	NAME	GPS NAVIGATOR
DWG NO.		C4427-C01-F		INTERCONNECTION DIAGRAM





(Elemental Chlorine Free)

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is elemental chlorine free.

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Printed in Japan

Pub. No. IME-44270-C1

( HIMA ) GP-90

FIRST EDITION :AUG. 2003

C1 : APR. 18, 2006



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